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A CONTRIBUTION TO THE STUDY OF THE FAUNA OF THE GRAVE. A STUDY OF ON HUNDRED AND FIFTY DISINTERMENTS, WITH SOME ADDITIONAL EXPERIMENTAL OBSERVATIONS.

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It were fitting, at the very outset of this report, to make acknowledgment of the kindly interest and assistance, through which alone the work was made possible: To Dr. Ch. Wardell Styles, Zoölogist of the Bureau of Animal Industry, U. S. Department of Agriculture, for the facilities of his laboratory; to the Entomologist, Dr. L. O. Howard, and his assistants, Messrs. Schwarz, Coquillett, Pergande, Banks, and Chittenden, and to Messrs. Simpson and Benedict, of the Smithsonian Institution, who, by their specific determinations and valued suggestions, have brought order out of the chaos of an amateur collector.

At the suggestion of Dr. Stiles, the work was undertaken to determine, if possible, the bearings of Mégnin's "Application of Entomology to Legal Medicine," in so far as they might be learned through a faunistic study of such disinterments as we should have access to, in and about the City of Washington. The collection and superficial differentiation of specimens were made by the writer, for the most part without assistance, it being found better to have all the observations made by the same individual. While, by this plan, less was accomplished in the way of collecting, what was done was done more thoroughly and uniformly. It is to be regretted that, owing to these circumstances, it was impossible to take fuller, more detailed notes of the general conditions observed in each disinterment.

This phase of the subject, the appearance and condition of the human cadaver, after varying periods of interment and under varying conditions, has received more or less scientific study for something over a hundred years at least. Beginning with the report, published in 1783, of the exhumations at Dunkerque, and continuing with Thouret's report of those by Fourcroy in 1789; Marc's article in the Dictionary of the Medical Sciences for 1815; the studies of Orfila and his associates, and the more recent studies of Bordas—throughout all, the difficulties and complications of the subject are seen to be such that, from the condition of the cadaver alone, no certain knowledge of the exact date of death is to be had.

Some of the conditions which influence and determine the process and progress of the decomposition of buried human cadavers would seem to be as follows: The age, sex, and perhaps even the race of the subject; the character and duration of the disease process to which he succumbed; the mode of death, whether quiet and peaceful or violent and painful; the season of the year at which this event occurs; the temperature and general conditions of the sick-room; the length of time intervening between death and burial; the attention given the corpse in the matter of cleaning, embalming and clothing; the kind of coffin in which it is placed, its internal fittings and external casings; the grave, its depth, the way it is prepared and filled, whether one or more interments be made in the same grave-site; the soil, its character physical and chemic, soil-temperature and soil-moisture; the general, physical, climatic and meteorologic conditions of the cemetery in which interment is made.

These are but some of the many factors which must be taken into consideration in the study of exhumed human cadavers. Just what weight should be given to each we seem, at present, utterly unable to determine. As in the study of the living, but diseased, subject, each case would seem to be a law unto itself; and our previous knowledge of apparently similar cases can afford suggestions only, not hard and fast rules. To illustrate, Barrett quotes from Orfila an exhumation, at Valenciennes, after fifteen years' interment, where "preservation was so perfect the inspectors were enabled to determine that the individual had not died a violent death, but of a peripneumony, complicated with a gastro-enteritis." In the following list will be found two cases (Nos. 7 and 8), in which, after but three years and six months, the skeletons were completely stripped and all soft tissues gone. Again, Orfila, Goedart and others have been led to the conclusion that, other things being equal, the deeper the grave the slower the progress of decomposition. In two cases following (Nos. 58 and 59), buried within sixteen days of each other, after an interment of seven years and nine months, the skeleton at the bottom of the grave was found almost wholly stripped, while the upper one had still a heavy case of adipocere.

So varied and so numerous are the modifying conditions and circumstances that it is impossible to say, definitely and absolutely, what is the exact order of disappearance of the several organs and tissues. Looking at the problem from the opposite standpoint, it seems that the bones and the hair are the last to undergo disintegration. I have found the bones, after an interment of seventy-one years, still preserving their general form and appearance, though easily crushed between thumb and fingers; the hair I have seen practically intact after thirty-six years. The brain I have found a still recognizable grayish mass, lying within the skull after all the other soft tissues had disappeared and the skeleton had been completely disarticulated. Indeed, I have found it, after eighteen years and two months (No. 136), lying on the occipital bone after the skull itself had fallen apart. Strange to say, the spinal cord seems to disappear much earlier; I have failed to find any vestige of it—in one case (No. 6)—after three years and five months. The skin and the more superficial connective tissues of the trunk and extremities are converted into a sort of case of adipocere, which preserves the general outline of the cadaver long after the internal organs, and the muscles and tendons even have been completely destroyed and the skeleton within stripped and disarticulated. Under ordinary conditions of interment, some, at least, of this adipocere may persist for ten or twelve years, remaining longest about the pelvis and lower part of the abdomen. I have been able to recognize the skin, fasciæ, muscles, tendons, vessels and nerves of the thigh in one cadaver (No. 44) after six years and five months; while, on the other hand, in another case (No. 40) the muscles had entirely disappeared after six years and three months. In most of the cases observed, the thoracic and abdominal organs seem to have disappeared before the muscles. The face, hands and feet seem to be the first parts attacked; I recall at least one instance where the skull was entirely stripped while as yet there seemed to be but little change elsewhere.

In the following pages I have brought together, for the purpose of a closer study and comparison, the notes of one hundred and fifty disinterments, made within the city limits of Washington, D. C., during the summers of 1896–97. The cases are arranged chronologically according to the period of interment of each, and the fauna is grouped systematically. The specimens will be deposited in the U. S. National Museum, at Washington, as the Stiles-Motter Collection of cadaveric fauna.

1.—1 yr. 11 mos. Grave 6 ft., moist; sandy. Erysipelas. Interred May 3, 1894.
Pseudoscorpiones, *Chelanops tristis* Bks., 14 specimens.
Thysanura, undetermined.
Coleoptera, Staphylinidæ, *Atheta*, sp. (*Homalota ?*), 1 specimen.
" " *Eleusis pallida* Lec., 2 specimens.
" Nitidulidæ, *Rhizophagus scalpturatus* Mann., 2 specimens.

2.—2 yrs. 10 mos. Grave 6 ft., coffin submerged; sand and clay. Interred July 14, 1894.
Thysanura, undetermined.
Diptera, Muscidæ, *Lucilia cæsar* Linn., puparia.
" Anthomyidæ, *Homalomyia*, sp.

3.—3 yrs. 1 mo. Grave 5 ft., wet; sand and clay. Hepatic abscess. Interred March 12, 1893.
Crustacea, *Armadillidium vulgare* Latr., 1 specimen.
Thysanura, undetermined.
Homoptera, Coccidæ, *Ripersia*, sp., in Phorid puparia.
Diptera, Phoridæ, puparia.

4.—3 yrs. 2 mos. Grave 6 ft., coffin submerged; sand and clay. Interred February 15, 1894.
Vermes, Lumbricid, undetermined.
Acarina, Gamasidæ, *Tyroglyphus*, sp.
Coleoptera, Staphylinidæ, *Actobius pæderoides* Lec., fragment.
" " *Pæderus littorarius* Grav., 3 specimens, two covered with undetermined fungus.
" " *Eleusis pallida* Lec., 160 specimens.
" Elateridæ, *Monocrepidius bellus* Say, 1 specimen.
Diptera, Stratiomyidæ, larva.
" Phoridæ, puparia.
" Sepsidæ, *Piophila casei* Linn., puparia.
" Borboridæ, wings (*Limosina ?*).

5.—3 yrs. 3 mos. Grave 3 ft., dry; sandy. (Infant.) Congestion of lungs. Interred February 21, 1893.
Diptera, Phoridæ, puparia.

6.—3 yrs. 5 mos. Grave 5 ft., coffin submerged; sand and clay. Interred January 18, 1894.
Diptera, Muscidæ, *Compsomyia macellaria* Fabr., puparia.
Only a few of these puparia found. Thoracic and abdominal organs, neck and soft tissues of face and hands destroyed. Abdominal and chest walls almost intact. Ribs not yet disarticulated. Spinal cord gone.

7.—3 yrs. 6 mos. Grave 5 ft., moist; sand and clay. Pneumonia. Interred December 29, 1893.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., numerous.

Diptera, Phoridæ, puparia.

Mites, thysanura and beetles working together in slimy debris about thighs and pelvis. All soft tissues gone; some clothing still remaining.

8.— 3 yrs. 6 mos. Grave 5 ft., moist; sand and clay. Bronchitis. Interred December 17, 1893.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., fragments.

Diptera, Phoridæ, puparia.

All soft tissues gone; some clothing still left.

9.—3 yrs. 6 mos. Grave 5 ft., moist; sand and clay. Phthisis. Interred December 10, 1893.

Araneida, *Theridion subterranea* Bks., sp. n.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 2 specimens.

" " *Eleusis pallida* Lec., numerous.

Diptera, Sepsidæ, *Piophila casei* Linn., puparia.

Thysanura, beetles and larvæ working in layers of adipocere, lower abdominal wall and pelvis.

10.—3 yrs. 6 mo. Grave 5 ft., moist; sand and clay. Phthisis. Interred November 20, 1893.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., numerous, adults and larvæ.

Beetles and larvæ especially about pelvis.

11.—4 yrs. 1 mo. Grave 5 ft., moist; sand and clay. Phthisis. Interred June 13, 1893.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., larva.

" " *Eleusis pallida* Lec., 6 specimens.

Diptera, Muscidæ, *Lucilia cæsar* Linn., puparia in great numbers.

" Sepsidæ, *Piophila casei* Linn.

Skeleton completely stripped and disarticulated. Mites on bones. Beetles and larvæ from slime in bottom of coffin.

12.—4 yrs. 1 mo. Grave 5 ft., moist; sand and clay. Uræmia. Interred June 6, 1893.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., adult and fragments.

13.—4 yrs. 1 mo. Grave 5 ft., moist; sand and clay. Dropsy (!). Interred May 25, 1893.

Araneida, *Erigone albescens* Bks., sp. n.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.
Diptera, Phoridæ, puparia.
Hymenoptera, Myrmicidæ, *Monomorium minutum* Mayer.

14.—4 yrs. 1 mo. Grave 3 ft., dry, sandy. Phthisis. Interred May 24, 1893.
Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.
Thysanura, undetermined.
Diptera, Phoridæ, puparia.
" Muscidæ, *Lucilia cæsar* Linn., puparia.
" Sepsidæ, *Piophila casei* Linn., wing.
No coffin, only burial case used. Myriads of mites, thysanura and puparia. No beetles nor larvæ. Skeleton stripped.

15.—4 yrs. 1 mo. Grave 5 ft., moist; sand and clay. Bronchitis. Interred May 18, 1893.
Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.
Thysanura, undetermined.
Pseudoneuroptera, *Termes flavipes* Kollar.
Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., fragments.
" Larvæ, undetermined.
Diptera, Phoridæ, puparia.
One live staphylinid escaped (*Actobius ?*). Skeleton stripped and dry.

16.—4 yrs. 2 mos. Grave 5 ft., moist; sand and clay. Senility. Interred May 7, 1893.
Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.
Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 and larva.
" " *Lathrobium simile* Lec., 1 specimen.
Diptera, Phoridæ, puparia.
Few insects found. Skeleton completely stripped. Some clothing still remaining.

17.—4 yrs. 2 mos. Grave 5 ft., moist; sand and clay. Nephritis. Interred May 8, 1893.
Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.
Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 and larvæ.
" " *Eleusis pallida* Lec., numerous.
" Larvæ, undetermined.
Beetles and larvæ especially about pelvis; elsewhere all soft tissues gone.

18.—4 yrs. 3 mos. Grave 5 ft., moist; sand and clay. Valvular disease of heart. Interred May 14, 1893.
Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.
Thysanura, undetermined.
Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 specimen.
" " *Eleusis pallida* Lec., numerous.
" Larvæ, undetermined.
Fairly alive with mites, thysanura, beetles and larvæ, working on surface of cadaver, under clothing. Cadaver large and heavy; general outlines still well preserved by case of adipocere.

19.—4 yrs. 4 mos. Grave 5 ft., moist; sand and clay. Interred March 28, 1893.
Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., numerous.
" Larvæ, undetermined.

20.—4 yrs. 5 mos. Grave 4 ft., moist; sand and clay. Interred January 24, 1893.
Thysanura, undetermined.
Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 specimen.
" " *Lathrobium*, sp., head of larva.
" Larvæ, undetermined.
Diptera, Sepsidæ, *Piophila casei* Linn., puparia.
A number of very minute, silvery thysanura, so active that it was almost impossible to take them.

21.—4 yrs. 10 mos. Grave 4 ft., moist; sand and clay. (Infant.) Diarrhœa. Interred September 6, 1892.
Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 specimen.
" " *Eleusis pallida* Lec., 7 specimens.
" Larvæ, undetermined.
Coffin filled with mud and slime.

22.—4 yrs. 11 mos. Grave 3 ft., moist; sand and clay. Cholera infantum. Interred August 9, 1892.
Coleoptera, larvæ, undetermined.
Bones almost disintegrated. Specimens from wood of bottom of coffin.

23.—5 yrs. Grave 6 ft., wet loose clay. Rheumatism. Interred April 17, 1891.
Thysanura, *Isotoma*, sp.
Coleoptera, Curculionidæ, larva (*Sphenophorus ?*).

24.—5 yrs. Grave 5 ft., coffin submerged; sand and clay. Typhoid. Interred May 13, 1891.
Thysanura, undetermined.
Coleoptera, Staphylinidæ, *Eleusis pallida* Lec.

25.—5 yrs. Grave 6 ft., wet, sandy. Phthisis. Interred April 23, 1891.
Thysanura, undetermined.

26.—5 yrs. 3 mos. Grave 5 ft., wet; sand and clay. Interred April 5, 1892.
Thysanura, undetermined.
Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 8 specimens.

27.—5 yrs. 3 mos. Grave 5 ft., moist; sand and clay. Congestion of brain. Interred March 22, 1892.
Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 specimen.
" " *Eleusis pallida* Lec., numerous.
" Larvæ, undetermined.
Considerable adipocere on legs and pelvis.

28.—5 yrs. 3 mos. Grave 5 ft., coffin submerged; sand and clay. Interred March 10, 1892.
Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.
Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., numerous.

29.—5 yrs. 4 mos. Grave 5 ft., wet; sand and clay. Typhoid. Interred March 9, 1892.
Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.
Coleoptera, Staphylinidæ, *Homalota*, sp., 5 specimens.
" " *Actobius umbripennis* Lec., fragments.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., numerous and fragments.

" Larvæ, undetermined.

Beetles found working in layers of adipocere and within the bones.

30.—5 yrs. 4 mos. Grave 5 ft., coffin submerged; sand and clay. Cardiac dropsy. Interred February 2, 1892.

Thysanura, undetermined.

Nothing left but the bones and some of them softened.

31.—5 yrs. 4 mos. Grave 5 ft., wet; sand and clay. Interred February 4, 1892.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., numerous.

Hymenoptera, Myrmicidæ, *Cremastogaster lineolata* Say.

32.—5 yrs. 4 mos. Grave 5 ft., moist; sand and clay. Interred February 29, 1892.

Thysanura, in great numbers, undetermined.

Coleoptera, Carabidæ, *Harpalus faunus* Say, 1 specimen.

" Staphylinidæ, fragments (*Eleusis ?*).

The carabid beetle was probably accidental.

33.—5 yrs., 4 mos. Grave 3 ft., moist; sand and clay. (Infant.) Phthisis. Interred February 22, 1892.

Myriapod, larva.

Coleoptera, Staphylinidæ, larva (*Philonthus ?*).

" Nitidulidæ, *Rhizophagus scalpturatus* Mann., 7 specimens.

Skeleton completely stripped and dry; some clothing still remaining.

34.—5 yrs., 5 mos. Grave 5 ft., wet; sand and clay. Pneumonia. Interred January 18, 1892.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 specimen.

" " *Eleusis pallida* Lec., 2 and fragments.

35.—5 yrs. 5 mos. Grave 5 ft., wet; sand and clay. Peritonitis. Interred January 18, 1892.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., numerous.

" Larvæ undetermined.

Beetles and larvæ burrowing in adipocere and soft bones.

36.—5 yrs. 5 mos. Grave 5 ft., wet; sand and clay. Cerebral congestion. Interred January 18, 1892.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., fragments.

Diptera, Phoridæ, puparia.

Probably embalmed. Soft tissues almost disappeared.

37.—5 yrs. 5 mos. Grave 5 ft., moist; sand and clay. Consumption. Interred January 24, 1892.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 2 and fragments.

Coleoptera, Nitidulidæ, *Rhizophagus scalpturatus* Mann., 1 specimen.
" Larvæ, undetermined.

38.—6 yrs. Grave 5 ft., moist; sandy. (Infant.) Tuberculosis. Interred June 31, 1891.

Pseudoscorpiones, *Chelanops tristis* Bks.
Myriapoda, undetermined.
Diptera, Phoridæ, puparia, in great numbers.

39.—6 yrs. 2 mos. Grave 5 ft., moist; sand and clay. Pneumonia. Interred April 22, 1891.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.
Thysanura, undetermined.
Coleoptera, Staphylinidæ, *Homalota*, sp., 1 specimen and larva.
" " *Eleusis pallida* Lec., numerous.
" Nitidulidæ, *Rhizophagus scalpturatus* Mann.

Soft tissues almost disappeared. Beetles in great numbers about patella and sternum.

40.—6 yrs. 3 mos. Grave 5 ft., coffin submerged; sand and clay. Pneumonia. Interred April 2, 1891.

Thysanura, in great numbers, undetermined.

No other insects seen. While grave was wet, cadaver had evidently been mummified. Skeleton stripped and disarticulated; muscles almost disappeared, only an outer shell of adipocere which preserved general outline of cadaver.

41.—6 yrs. 5 mos. Grave 6 ft., coffin submerged; sand and clay. Interred December 26, 1890.

Thysanura, undetermined.
Diptera, Sepsidæ, *Piophila casei* Linn., puparia.

42.—6 yrs. 5 mos. Grave 5 ft., coffin submerged; sand and clay. Phthisis. Interred January 23, 1891.

Thysanura, undetermined.
Coleoptera, fragments, undetermined.
Diptera, Phoridæ (?), puparium.
Nothing but hard bones left.

43.—6 yrs. 5 mos. Grave 5 ft., wet; sand and clay. Senile debility. Interred February 1, 1891.

Thysanura, undetermined.
Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 specimen.
" " *Eleusis pallida* Lec., numerous.
" Larvæ, undetermined.

All soft tissues gone. Thysanura, beetles and larvæ working inside the bones, entering through nutrient canals, etc.

44.—6 yrs. 5 mos. Grave 5 ft., coffin submerged; sand and clay. Senile debility. Interred February 2, 1891.

Thysanura, undetermined.

Thoracic and abdominal cavities emptied; lower ends of limbs (upper and lower) stripped. Tissues (skin, fasciæ, muscles, tendons, vessels and nerves) still distinguishable about thighs.

45.—6 yrs. 9 mos. Grave 6 ft., coffin submerged; sand and clay. Cerebral embolism. Interred August 8, 1889.

Thysanura, undetermined.

46.—6 yrs. 11 mos. Grave 4 ft., coffin submerged; sand and clay. Interred May 18, 1890.

Myriapoda, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 2 specimens.

Diptera, Sepsidæ, *Piophila casei* Linn., puparia.

47.—7 yrs. Grave 4 ft., moist; sand and clay. Still-born. Interred July 28, 1890.

Gastropoda, *Helicodiscus lineatus* Say.

Crustacea, undetermined.

Araneida, *Theridion subterranea* Bks., sp. n.

Thysanura, undetermined.

Diptera, Phoridæ, puparia.

Smaller bones, skull, etc., almost disintegrated and pulverizable. Snails from coffin lid; spider and a few thysanura inside.

48.—7 yrs. Grave 5 ft., moist; sand and clay. Interred ——— —— 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 3 and larvæ.
" " *Eleusis pallida* Lec., numerous.
" " Undetermined, covered with fungus.
" Larvæ, undetermined.

Skeleton stripped and disarticulated lying within shell of adipocere. Clothing fairly preserved.

49.—7 yrs. 4 mos. Grave 5 ft., coffin submerged; sand and clay. Interred December 16, 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 2 specimens.

50.—7 yrs. 4 mos. Grave 5 ft., moist; sand and clay. Typhoid. Interred May 5, 1890.

Araneida, *Theridion subterranea* Bks., sp. n.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec.
" Larvæ, undetermined.

Diptera, Sepsidæ, *Piophila casei* Linn., puparia.
" Borboridæ, *Limosina ?* wings.

Hymenoptera, Myrmicidæ, *Aphenogaster*, sp.

Skeleton completely stripped and disarticulated. Black, wet, powdery debris in bottom of coffin, alive with mites, thysanura and a few larvæ.

51.—7 yrs. 4 mos. Grave 5 ft., moist; sand and clay. Valvular disease of heart. Interred March 4, 1890.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec.
" Larvæ, undetermined.

Thorax not yet evacuated. Heavy case of adipocere; within, skeleton pretty well cleaned.

52.—7 yrs. 7 mos. Grave 5 ft., moist; sand and clay. Exposure to cold (!). Interred December 7, 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., fragments.

Skeleton completely stripped.

53.—7 yrs. 7 mos. Grave 5 ft., moist; sand and clay. Inanition. Interred December 13, 1889.

Acarina, Gamasidæ, *Uropoda depressa* Bks., sp. n.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., fragments.

" Larvæ, undetermined.

Diptera, Phoridæ, puparia.

Skeleton stripped.

54.—7 yrs. 8 mos. Grave 5 ft., moist; sand and clay. Intermittent fever. Interred November 15, 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., fragments.

Skeleton stripped. Coffin dry inside, completely overgrown with roots.

55.—7 yrs. 8 mos. Grave 5 ft., wet, sand and clay. Obstruction of bowels. Interred November 10, 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 2 specimens.

" Larvæ, undetermined.

Skeleton stripped.

56.—7 yrs. 8 mos. Grave 5 ft., moist; sand and clay. Accident. Interred October 7, 1889.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec.

" " *Eleusis pallida* Lec.

Skeleton stripped and disarticulated; adipocere almost consumed.

57.—7 yrs. 9 mos. Grave 3 ft., moist; sand and clay. Diphtheria. Interred October 17, 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 6 specimens.

" Larvæ, undetermined.

Skeleton stripped and disarticulated, lying within heavy case of adipocere which was very black on surface. Many *Eleusis* dead on outside of coffin.

This cadaver in same grave with 58.

58.—7 yrs. 9 mos. Grave 5 ft., moist; sand and clay. Diphtheria. Interred October 1, 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 specimen.

" " *Eleusis pallida* Lec., numerous.

" Larvæ, undetermined.

Very little adipocere left. This buried in same grave underneath No. 57.

59.—7 yrs. 10 mos. Grave 5 ft., moist; sand and clay. Dysentery. Interred September 24, 1889.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 2 specimens.

Coffin too full of earth to examine thoroughly. Specimens from skull.

60.—7 yrs. 10 mos. Grave 5 ft., moist; sand and clay. Pneumonia. Interred September 16, 1889.

Thysanura, in great numbers, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 2 specimens.

Cadaver large and heavy; outlines preserved by heavy case of adipocere, skeleton within stripped.

61.—7 yrs. 10 mos. Grave 5 ft., moist; sand and clay. Heart disease (!). Interred September 14, 1889.

Thysanura, in great numbers, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 8 specimens.

Many *Eleusis* on coffin lid, outside and in. Skull entirely stripped; heavy case of adipocere below this; within, skeleton stripped.

62.—8 yrs. 2 mos. Grave 5 ft., moist; sand and clay. Convulsions (!). Interred May 5, 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 3 specimens.
“ “ *Eleusis pallida* Lec., numerous.
“ “ Larvæ (*Eleusis ?*).
“ Nitidulidæ, *Rhizophagus scalpturatus* Mann., numerous.

Upper half of cadaver completely stripped. Myriads of thysanura, beetles and larvæ on lower half, on and under clothing and in adipocere.

63.—8 yrs. 2 mos. Grave 5 ft., moist; sand and clay. Phthisis. Interred April 27, 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec.

Bones completely stripped; but one beetle and few thysanura seen.

64.—8 yrs. 2 mos. Grave 5 ft., moist; sand and clay. Debility (!). Interred May 3, 1889.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., 1 specimen.
“ “ *Eleusis pallida* Lec., numerous.
“ Nitidulidæ, *Rhizophagus scalpturatus* Mann., 4 specimens.
“ Larvæ, undetermined.

Thysanura, beetles and larvæ in layers of adipocere, about pelvis, and on skull under hair.

65.—8 yrs. 3 mos. Grave 5 ft., wet; sandy. (Infant.) Malnutrition. Interred February 2, 1888.

Thysanura, undetermined.

66.—9 yrs. 4 mos. Grave 6 ft., coffin submerged; sand and clay. Interred January 27, 1888.

Thysanura, undetermined.

Diptera, Sepsidæ, *Piophila casei* Linn., puparia.

67.—9 yrs. 9 mos. Grave 5 ft., moist; sand and clay. Phthisis. Interred September 18, 1887.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Lathrobium simile* Lec., 3 specimens.
“ “ *Eleusis pallida* Lec., 6 specimens.

Diptera, Phoridæ, puparia.

68.—10 yrs. Grave 5 ft., wet; sand and clay. Phthisis. Interred July 7, 1887.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 3 and fragments.

" Fragments, undetermined.

Diptera, Phoridæ, puparia.

69.—10 yrs. Grave 5 ft., moist; sand and clay. Diarrhœa. Interred July 14, 1887.

Crustacea, undetermined.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Homalota*, sp.

" " *Eleusis pallida* Lec.

" Larvæ, undetermined.

Diptera, Phoridæ, puparia.

Thysanura, beetles and larvæ burrowing in wood of coffin, in layers of adipocere, and in cancellated bone tissue, sternum, patella, etc.

70.—10 yrs. 2 mos. Grave 4 ft., coffin submerged; sand and clay. (Infant.) Marasmus. Interred April 25, 1887.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 10 specimens.

71.—10 yrs. 3 mos. Grave 5 ft., coffin submerged; sand and clay. Phthisis. Interred March 6, 1887.

Thysanura, undetermined.

72.—10 yrs. 3 mos. Grave 6 ft., coffin submerged; sand and clay. Interred March 9, 1887.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec.

Diptera, Sepsidæ, *Piophila casei* Linn., puparia.

Pupæ apparently viable when taken but failed to breed in the laboratory.

73.—10 yrs. 4 mos. Grave 5 ft., coffin submerged; sand and clay. Cholera. Interred February 15, 1887.

Gastropoda, *Helicodiscus lineatus* Say.

Vermes, undetermined.

Crustacea, *Armadillidium ?*

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 3 specimens.

74.—10 yrs. 7 mos. Grave 9 ft., damp; loose sand. Tetanus. Interred September 21, 1885.

Crustacea, *Armadillidium vulgare* Ltr., 3 specimens.

Thysanura, *Isotoma*, sp.

75.—10 yrs. 8 mos. Grave 5 ft., coffin submerged; sand and clay. Consumption. Interred September 23, 1886.

Thysanura, undetermined.

Coleoptera; Nitidulidæ, *Rhizophagus scalpturatus* Mann., 7 specimens.

76.—10 yrs. 8 mos. Grave 6 ft., coffin submerged; sand and clay. Consumption. Interred October 3, 1886.

Thysanura, undetermined.

77.—11 yrs. 2 mos. Grave 5 ft., coffin submerged; sand and clay. Hepatic colic. Interred April 8, 1886.

Thysanura, undetermined

Coleoptera, Staphylinidæ, *Eleusis pallida* Lec.

78.—12 yrs. 11 mos. Grave 6 ft., dry; sandy. Phthisis. Interred July 27, 1883.

Crustacea, undetermined.

Araneida, *Bathyphantes*, sp. n.; *Cicurina arcuata* Keys.

Myriapoda, *Isobates* (*I. minutus* Brandt?).; *Iulus*, sp.

Pseudoneuroptera, *Termes flavipes* Kollar, 7 specimens.

Coleoptera, Staphylinidæ, larva undetermined.

" Nitidulidæ, *Rhizophagus scalpturatus* Mann., fragments.

Diptera, Phoridæ, puparia.

79.—15 yrs. 5 mos. Grave 7 ft., dry; sandy. (Infant.) Diphtheria. Interred December 17, 1880.

Araneida, *Cicurina creber* Bks.

Myriapoda, *Iulus*, sp., numerous.

Coleoptera, Staphylinidæ, *Staphylinus cinnamopterus* Grav., 2 specimens, probably accidental, found outside coffin in grave.

Diptera, Phoridæ, puparia.

80.—15 yrs. 10 mos. Grave 4 ft., coffin submerged; sand and clay. Interred September 29, 1881.

Thysanura, undetermined.

Coleoptera, Carabidæ, *Schizogenius amphibius* Hald., fragments, probably accidental.

Diptera, Phoridæ, puparia.

81.—16 yrs. 5 mos. Grave 9 ft., moist; sand. Apoplexy. Interred January 18, 1881.

Gastropoda, *Zonitoides minusculus* Binn.

Vermes, undetermined.

Crustacea, undetermined.

Pseudoscorpiones, *Chelanops tristis* Bks.

Araneida, *Circurina creber* Bks.; *Theridion subterranea* Bks., sp. n.; *Erigone albescens* Bks., sp. n.

Myriapoda, undetermined.

Thysanura, undetermined.

Coleoptera, Pselaphidæ, *Batrisus* (*ferox ?*).

" Nitidulidæ, *Rhizophagus scalpturatus* Mann., fragments.

Diptera, Phoridæ, puparia.

Hymenoptera, Formicidæ, *Lasius flavus* De Geer.

Dry disarticulated bones and portion of coat lying in brown, powdery debris, fairly swarming with the above animals.

82.—18 yrs. 11 mos. Grave 3 ft., dry; sandy. (Infant.) Aphtha. Interred January 18, 1879.

Crustacea, undetermined.

Araneida, *Bathyphantes*, sp. n.

Myriapoda, *Isobates* (*I. minutus* Brandt?) numerous; *Iulus*, sp.

83.—20 yrs. Grave 3 ft., dry; sandy. (Infant.) Gastritis. Interred June 26, 1876.
Vermes, undetermined.
Crustacea, undetermined.
Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.
Diptera, Phoridæ, puparia.

84.—20 yrs. Grave 9 ft., dry; sandy. Enteritis. Interred May 9, 1876.
Diptera, Phoridæ, puparia.

85.—20 yrs. 3 mos. Grave 5 ft., dry; sandy. (Infant.) Meningitis. Interred February 14, 1876.
Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.
Diptera, Phoridæ, puparia.

86.—20 yrs. 7 mos. Grave 4 ft., dry; sandy. (Infant.) Pertussis. Interred August 8, 1875.
Gastropoda, *Vitrea electrina* Gould.
Thysanura, *Japyx* (*J. subterraneus* Pack.?).
Diptera, Phoridæ, puparia.

87.—20 yrs. 9 mos. Grave 6 ft., dry, sandy. (Infant.) Diarrhœa. Interred August 26, 1875.
Myriapoda, *Iulus*, sp.
Coleoptera, Carabidæ, *Dicælus ovalis* Lec., 1 specimen. Probably accidental, from bottom of grave.
" Elateridæ, larvæ, undetermined, fragment.
Diptera, Phoridæ, puparia.

88.—21 yrs. Grave 3 ft., dry; sandy. (Infant.)
Gastropoda, *Zonitoides minusculus* Binn.
Vermes, undetermined.
Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.
Diptera, Phoridæ, puparia.

89.—21 yrs. Grave 3 ft., dry, sandy.
Gastropoda, *Helicodiscus lineatus* Say.
Araneida, *Theridium*, sp. (*T. subterranea* Bks.?).
Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.; *Striaria*, sp.; *Scolopocryptops sexspinosa* Say.
Coleoptera, Trogositidæ, *Tenebrioides laticollis* Horn. Fragments.
Diptera, Phoridæ, puparia.

90.—21 yrs. Grave 3 ft., dry, sandy. (Infant.)
Myriapoda, *Iulus*, sp.
Diptera, Phoridæ, puparia.

91.—21 yrs. Grave 4 ft., dry, sandy. (Infant.)
Gastropoda, *Helicodiscus lineatus* Say.
Myriapoda, *Isobates* (*I. minutus* Brandt?).
Coleoptera, Pselaphidæ, *Batrisus ferox* Lec.
Diptera, Phoridæ, puparia.

92.—21 yrs. Grave 4 ft., dry, sandy. (Infant.)
Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.
Diptera, Phoridæ, puparia.

93.—21 yrs. Grave 4 ft., dry, sandy. (Infant.)
Gastropoda, *Helicodiscus lineatus* Say.
Araneida, *Cicurina creber* Bks.
Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.
Coleoptera, Scarabæidæ, *Lachnosterna*, sp. Probably accidental.
Diptera, Phoridæ, puparia.
Hymenoptera, Formicidæ, *Brachymyrmex heeri* Forel.
" Poneridæ, *Ponera contracta* Latr.
" Myrmicidæ, *Myrmicina latreilli* André.

94.—21 yrs. Grave 6 ft., dry, sandy. (Infant.)
Myriapoda, *Iulus*, sp.
Diptera, Phoridæ, puparia.

95.—21 yrs. Grave 6 ft., dry, sandy. (Infant.)
Gastropoda, *Helicodiscus lineatus* Say.
" *Zonitoides minusculus* Binn.
Araneida, *Lophocarenum*, sp.
Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.
Thysanura, *Lepidocyrtus*, sp.
Diptera, Phoridæ, puparia.

96.—21 yrs. Grave 6 ft., dry, sandy. (Infant.)
Araneida, Agalenidæ (*Cicurina ?*).
Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.
Diptera, Phoridæ, puparia.

97.—27 yrs. Grave 8 ft. dry, sandy. (Infant.) Interred November 2, 1869.
Myriapoda, undetermined.
Diptera, Phoridæ, puparia. (*Conicera ?*)

98.—29 yrs. 1 mo. Grave 6 ft., dry, sandy. (Infant.) Interred May 25, 1867.
Araneida, *Argiope*, sp.
Hymenoptera, Formicidæ, *Lasius americanus* Emery.

99.—38 yrs. 4 mos. Grave 6 ft., dry; sandy. Interred June 29, 1861.
Araneida, *Cicurina creber* Bks.
Acarina, Gamasidæ, *Gamasus*, sp.
Myriapod, undetermined.
Diptera, Phoridæ, puparia (*Conicera ?*).

100.—71 yrs. Grave 6 ft., dry; sandy.
Gastropoda, *Heliocodiscus lineatus* Say.
Acarina, *Hypopus*, sp.
Bones dry and crumbling; rib picked up by its sternal end broke and crushed in falling by its own weight. Oscalcis, astragalus, head of femur, etc., crushed with little or no pressure. Wood of coffin dry and crumbling; medullary rays beautifully and clearly outlined; penetrated, more especially through long diameter, by numerous dead, dry, filamentous roots. Knots curiously demarcated and encapsulated. All dry, brown and pulverulent.

Note 1. Numbers 88–96 inclusive were interred prior to 1875, before the cemetery records were fully kept.

2. Numbers 5, 38, 74, 78, 79, 81–99 inclusive, are especially noteworthy on account of the unusual method of interment followed in the cemetery from which all were taken. Here, in every instance, each separate burial case is inclosed in a four-inch brick wall, laid in cement, and covered with stone or slate slabs, likewise sealed with cement, thus making what is practically a vault for each interment. This, it would seem, would prove an almost impenetrable barrier to the necrophagous fauna. It must be remembered, however, that, no matter how carefully prepared and laid, this cement, sooner or later, disintegrates; and that, save where two or more interments are made in the same grave-site—as is here not infrequently the case—the bottom of these vault-chambers is of earth, not of brick or stone. But, even where one vault is built on top of another, the crumbling cement leaves interstices between the bricks, through which, as we have seen, come diverse sorts of animals.

The following list of fifty cases includes those in which the examination was, for one reason or another, incomplete, the records fragmentary or unreliable, or the specimens lost.

101.—5 mos. Grave 6 ft., dry; sandy. Pneumonia. Interred January 22, 1896.

No insects found. Body embalmed and in good state of preservation. Slight whitish fungus over lower part of face and hands.

102.—1 yr. 2 mos. Grave 4 ft., moist; sand. Gastro-enteritis. Interred April 29, 1896.

On outside of coffin, chelifer, spider and thysanura; inside no insects found. Cadavar embalmed, tissue leathery, covered with thick, white, felt-like fungus.

103.—3 yrs. Grave 6 ft., dry; sandy. Consumption. Interred May 11, 1894.

Chelanops tristis Bks. and thysanura on outside of coffin. No insects inside. Body embalmed. Bones of skull clean, covered with thick, white fungus. Examination interrupted.

104.—3 yrs. 3 mos. Grave 7 ft., day; sandy. Asphyxia. Interred July 20, 1893.

Body embalmed and well preserved. Face and hands covered with thick, white fungus. No insects found.

105.—4 yrs. Grave 5 ft., moist; sand and clay. Interred July 14, 1893.

Had not sufficient time to examine thoroughly. Fragments of numerous staphylinids (*Eleusis pallida* Lec.?) no specimens taken.

106.—4 yrs. 1 mo. Grave 5 ft., coffin submerged; sand and clay. Valvular disease heart. Interred May 1, 1893.

Too wet to handle. Coffin contained embalming fluid. Skull stripped, some adipocere still remaining on lower limbs.

107.—4 yrs. 2 mos. Grave 3 ft., moist; sand and clay. Still-born. Interred April 24, 1893.

Gastropoda, *Helicodiscus lineatus* Say.

Diptera, Sepsidæ, *Piophila casei* Linn., puparia.

108.—4 yrs. 4 mos. Grave 3 ft., moist; sand and clay. (Infant.) Interred March 11, 1893.

A few thysanura only. Everything but the disarticulated bones gone. Coffin dry inside; roots and grasses growing up through bones and remnants of clothing.

109.—4 yrs. 7 mos. Grave 5 ft., coffin submerged; sand and clay. Pneumonia. Interred December 12, 1892.

Thysanura only. Considerable adipocere left. Intestines not yet destroyed. In vault 1 month.

110.—5 yrs. 3 mos. Grave 6 ft., coffin submerged; sand and clay. Interred February 29, 1892.

Thysanura only. In vault 2 months.

111.—5 yrs. 4 mos. Grave 5 ft., coffin submerged; sand and clay. Cholera. Interred February 26, 1892.

Thysanura and staphylinid fragments, specimens lost. Heavy case of adipocere, swarming with Thysanura.

112.—5 yrs. 5 mos. Grave 5 ft., coffin submerged; sand and clay. Pneumonia. Interred January 2, 1892.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec.

113.—6 yrs. 2 mos. Grave 5 ft., moist; sand and clay. Paralysis. Interred April 28, 1891.

Coffin too much broken in removal to be accurate about contents.

114.—6 yrs. 5 mos. Grave 5 ft., coffin submerged; sand and clay. Inflammation bowels. Interred February 9, 1891.

No insects, *not even Thysanura !*

115.—6 yrs. 5 mos. Grave 5 ft., coffin submerged; sand and clay. Pneumonia. Interred February 2, 1891.

Skeleton completely disarticulated, even skull, which contained pultaceous brain mass. Little adipocere left.

116.—6 yrs. 7 mos. Grave 5 ft., coffin submerged; sand and clay. Interred December 18, 1890.

No insects found. Clothing almost intact. Skeleton stripped and disarticulated.

117.—6 yrs. 9 mos. Grave 5 ft., coffin submerged; sand and clay. Typhoid. Interred September 7, 1890.

Thysanura only.

118.—7 yrs. 3 mos. Grave 9 ft., dry; sandy. Hemorrhage from lungs. Interred July 27, 1889.

Thysanura and acarids. Specimens lost.

119.—7 yrs. 5 mos. Grave 5 ft., coffin submerged; sand and clay. Membraneous croup. Interred January 20, 1890.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., fragment, covered with undetermined fungus.

" " *Eleusis pallida* Lec.

120.—7 yrs. 5 mos. Grave 5 ft., moist; sand and clay. Phthisis. Interred February 27, 1890.

Thysanura, undetermined.

Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., one dead covered with
" " white fungus.
" " *Eleusis pallida* Lec.
" " Undetermined.
Diptera, Sepsidæ, *Piophila casei* Linn., puparia.
" Borboridæ, *Limosinia*, sp., wings.
Skeleton completely stripped, no adipocere left.

121.—7 yrs. 5 mos. Grave 5 ft., moist; sand and clay. Chronic diarrhœa. Interred February 24, 1890.
Gastropoda, *Helicodiscus lineatus* Say.
" *Zonitoides arboreus* Say.
Araneida, *Theridion subterranea* Bks., sp. n.
Coleoptera, larvæ, undetermined.
Diptera, Sepsidæ, *Piophila casei* Linn., puparia.
Skeleton completely stripped.

122.—7 yrs. 7 mos. Grave 6 ft., coffin submerged; sand and clay. Interred September 15, 1889.
Skeleton completely stripped and disarticulated; bones solid and black as ebony, some small detached masses of adipocere still remaining in coffin.
Not a sign of an insect to be found.

123.—7 yrs. 10 mos. Grave 5 ft., moist; sand and clay.
Coffin crushed in and full of earth, no specimens taken.

124.—7 yrs. 10 mos. Grave 5 ft., moist; sand and clay.
Coffin crushed in and full of earth, no specimens taken.

125.—8 yrs. 4 mos. Grave 5 ft., coffin submerged; sand and clay. Congestion brain. Interred March 9, 1889.
In vault 1 month. Skeleton completely stripped; a few masses of adipocere left from lower abdominal walls. No specimens taken.

126.—10 yrs. 1 mo. Grave 5 ft., coffin submerged; sand and clay. Dropsy (!).
Examined by assistant, no specimens.

127.—10 yrs. 1 mo. Grave 5 ft., coffin submerged.
Coleoptera, Staphylinidæ, *Actobius umbripennis* Lec., fragments.

128.—10 yrs. 2 mos. Grave 5 ft., coffin submerged; sand and clay. Interred April 3, 1887.
A few Thysanura only. No specimens taken.

129.—11 yrs. Grave 5 ft., dry; sandy. Still-born. Interred October 24, 1885.
Diptera, Phoridæ, puparia (*Conicera ?*), specimens lost.

130.—11 yrs. Grave 5 ft., wet; sandy.
Thysanura, undetermined.
Coleoptera, Staphylinidæ, *Eleusis pallida* Lec.

131.—11 yrs. 7 mos. Grave 5 ft., wet; sandy. Tetanus. Interred November 1884.
Araneida, *Lepthyphantes*, sp.
Pseudoneuroptera, *Termes flavipes* Kollar.
Diptera, Phoridæ, puparia.
In vault three months. Ob. 30, VIII, 84.

132.—12 yrs. 3 mos. Grave 6 ft., coffin submerged; sand and clay. Phthisis. Interred February 29, 1884.

Thysanura only. In vault 1 month.

133.—14 yrs. 5 mos. Grave 6 ft., dry "rotten rock." Peritonitis. Ob. 5, IX, 81, Mass. Interred November 22, 1881, D. C.

Diptera, Phoridæ, puparia.

Cadaver mummified, surface moist, skin and appendages practically intact. Coffin in tin-lined case, top tacked on.

134.—14 yrs. 8 mos. Grave 5 ft., dry, sandy. Hydrocephalus. Interred March 3, 1882.

Diptera, Phoridæ, puparia (*Conicera ?*), specimens lost.

135.—16 yrs. Grave 9 ft., dry, sandy. Œdema of lungs. Interred October 9, 1880. Thysanura only. In vault 9 days.

136.—18 yrs. 2 mos. Grave 5 ft., coffin submerged; sand and clay. Interred May 13, 1879.

No insects save a few Thysanura on inner side of coffin. Skeleton completely stripped and disarticulated. Some grayish brain matter still left within disarticulated skull.

137.—18 yrs. 3 mos. Grave 5 ft., coffin submerged; sand and clay. Membraneous Croup. Interred February 2, 1878.

No insects found.

138.—19 yrs. 2 mos. Grave 6 ft., dry, sandy. Bright's disease. Ob. 9, I, 77. Interred April 17, 1877.

Gastropoda, *Helicodiscus lineatus* Say.

Araneida, *Lophocarenum*, sp.; *Lycosa*, sp.

Hymenoptera, Formicidæ, *Camponotus melleus* Say.

139.—20 yrs. 3 mos. Grave 5 ft., wet, sand and clay. Phthisis. Interred Apr. 5, 1876.

No insects found.

140.—24 yrs. 5 mos. Grave 5 ft., dry, sandy. Dysentery. Ob. 13, III, 72. Interred May 25, 1872.

Gastropoda, *Helicodiscus lineatus* Say.

Araneida, *Cicurina creber* Bks.

Acarina, *Hypopus*, sp.

Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.

Thysanura, undetermined.

Diptera, Phoridæ, puparia (*Conicera ?*).

In vault two months.

141.—28 yrs. Grave 9 ft., dry, sandy. Pneumonia. Ob. 25, IX, 68, N. J. Interred April 25, 1884, D. C.

Crustacea, undetermined.

Pseudoscorpiones, *Chelanops tristis* Bks.

Araneida, *Theridium tepidariorum* Koch.

Acarina, Gamasidæ, *Hypoaspis*, sp.

Myriapoda, *Isobates* (*I. minutus* Brandt?); *Iulus*, sp.

Thysanura, *Entomobrya*, sp.

Coleoptera, Pselaphidæ, *Batrisus globosus* Lec.

" Nitidulidæ, *Rhizophagus scalpturatus* Mann.

Diptera, Drosophilidæ, *Drosophila ampelophila* Loew, probably accidental.

142.—36 yrs. No insects found.
143.—36 yrs. (Infant.) No insects found.
144.—36 yrs. (Infant.) No insects found.
145.—56 yrs. (Infant.) No insects found.
146.—Coffin so decayed and grave so wet, no definite results obtainable.
147.—Coffin so decayed and grave so wet, no definite results obtainable.
148.—Murder case, coffin filled with all sorts of rubbish; not examined.
149.—Negro, aet. 18 yrs. (?) drowned, 7th St. wharf, August 29th. Body recovered August 30th, inclosed in tin-lined case August 31st. Examined at Morgue September 2d. Larvæ taken from hair, face and clothing, September 16th bred:

Diptera, Muscidæ, *Compsomyia macellaria* Fabr.
" " *Lucilia cæsar* Linn.

150.—7 yrs. 3 mos. Grave 4 ft., moist, sand and clay. Premature birth.

No cadaver found in coffin, nothing to indicate that it had ever been placed therein. Clothes nicely folded in bottom of coffin. A most thorough search revealed but the following:

Thysanura, undetermined.
Coleoptera, Staphylinidæ, *Eleusis pallida* Lec., 1 specimen.
" Larvæ, undetermined.
Diptera, Phoridæ, puparium.

Note 3. Numbers 101–104, 118, 129, 133, 134, 135, 138, 140, 141 graves prepared as explained in note 2, page 217.

Note 4. The undetermined Coleopterous larvæ mentioned in the above lists belong, according to Mr. Schwarz, to but three species: *Actobius umbripennis* Lec., *Eleusis pallida* Lec. and *Rhizophagus scalpturatus* Mann. Owing to the illness of Mr. Schwarz, the determinations could not be specified in each case.

Grouped and arranged in systematic order, the fauna of the one hundred and fifty disinterments studied, as thus far determined, stands as follows:

GASTROPODA.

Helicodiscus lineatus Say.
Zonitoides arboreus Say.
Zonitoides minusculus Binn.
Vitrea electrina Gould.

Vermes, undetermined.

CRUSTACEA.

Armadillidium vulgare Ltr., many undetermined.

ARACHNIDA.

Pseudoscorpiones, *Chelanops tristis* Bks.

ARANEIDA.

Agalena, sp.
A. nævia Htz.
Lepthyphantes, sp.
Lophocarenum, sp.

Argiope, sp.
Lycosa, sp.
Bathyphantes, sp. n.
Theridium tepidariorum Koch.
Cicurina arcuata Keys.
Theridion subterranea Bks., sp. n.
Cicurina creber Bks.
Erigone albescens Bks., sp. n.

ACARINA.

Gamasidæ, *Gamasus*, sp.
Iphis, sp.
Holostaspis, sp.
Uropoda, sp.
Hypoaspis, sp.
Uropoda depressa Bks., sp. n.
Tyroglyphidæ, *Tyroglyphus*, sp.
Hypopus, sp.
Oribatidæ, *Hoplophora*, sp. (*Tritia*).

MYRIAPODA.

Isobates (*I. minutus* Brandt?).
Striaria, sp.
Iulus, sp.
Scolopocryptops sexspinosa Say.
Lithobius, sp.

THYSANURA.

Japyx, sp. (*J. subterranea* Packard?).
Entomobrya, sp.
Lepidocyrtus, sp.
Podura, sp.
Many undetermined.

PSEUDONEUROPTERA.

Psocidæ, undetermined.
Termes flavipes Kollar.

HOMOPTERA.

Coccidæ, *Ripersia*, sp.

COLEOPTERA.

Carabidæ, *Schizogenius amphibius* Hald.
Dicælus ovalis Lec.
" *Harpalus faunus* Say.
Pselaphidæ, *Batrisus ferox* Lec.
Batrisus globosus Lec.
Staphylinidæ, *Atheta*, sp.
Actobius pæderoides Lec.
Homalota, sp.
Lathrobium simile Lec.
Staphylinus cinnamopterus Grav.
Pæderus littorarius Grav.
Philonthus, sp.
Eleusis pallida Lec.
Actobius umbripennis Lec.
Trichopterygidæ, *Trichopteryx haldemanni* Lec.
Nitidulidæ, *Rhizophagus scalpturatus* Mann.
Trogositidæ, *Tenebrioides laticollis* Horn.
Elateridæ, *Monocrepidius bellus* Say.
Scarabæidæ, *Lachnosterna*, sp.
Curculionidæ, *Sphenophorus*, sp.

DIPTERA.

Mycetophilidæ, *Sciara*, sp.
Stratiomyidæ (larva).
Phoridæ (puparia), *Phora clavata* Loew ; *Conicera*, sp.
Muscidæ, *Compsomyia macellaria* Fabr.; *Lucilia cæsar* Linn.
Anthomyidæ, *Homalomyia*, sp.; *Ophyra leucostoma* Wied.
Sepsidæ, *Piophila casei* Linn.
Drosophilidæ, *Drosophila ampelophila* Loew.
Borboridæ, *Limosina*, sp.

HYMENOPTERA.

Formicidæ, *Brachymyrmex heeri* Forel.; *Camponotus melleus* Say.
" *Lasius americanus* Emery ; *Lasius flavus* DeGeer.
Poneridæ, *Ponera contracta* Latr.
Myrmicidæ, *Myrmicina latreillii* André.
Monomorium minutum Mayer.
Cremastogaster lineolata Say.
Aphenogaster, sp.

This list includes the names of a few species found, not in the one hundred and fifty human disinterments studied, but in the experimental observations, viz.: The undetermined Psocid, the Dipteron *Sciara* sp., and the Coleopteron *Trichopteryx haldemanni* Lec. were found in the empty boxes, buried for experimental purposes; while the Myriapod *Lithobius* sp., and the Diptera *Conicera* sp., *Phora clavata* Loew, and *Ophyra leucostoma* Wied., were found on dog cadavers, as noted elsewhere.

During the summer of 1896 the cadavers of a number of dogs, which had been examined in the laboratory for parasites, were tightly nailed up. each in a wooden box, and buried in a neighboring plot at a depth of two feet. Two of these, examined after two months, showed only the following Diptera: Phoridæ, *Phora clavata* Loew. Muscidæ, *Lucilia cæsar* Linn. Anthomyidæ, *Ophyra leucostoma* Wied. Of these, I have found only the Muscid on human cadavers, in four instances: (*a*) The living larvæ were found on the cadaver of a drowned negro after an exposure of three days and bred to the adult stage (No. 149). (*b*) The puparia were found on a cadaver (No. 2) which had been buried for two years and eleven months; and (*c*) puparia were likewise found on two cadavers (Nos. 11 and

14) which had been buried four years and one month. On the dog cadaver, buried two months, was found a fragment of one adult fly. This fly Mégnin puts in his second "squad," which arrives on cadavers a few hours after death. The Phorid was found in great numbers in the adult stage, busily feeding upon the contents of the box, which emitted a very pungent ammoniacal odor.

The Anthomyid was taken in the larval stage and bred in great quantities, in the laboratory, even unto the third and fourth generations. Notes of these breeding experiments were presented to the Entomological Society of Washington and will appear in the forthcoming issue of its Proceedings. Suffice it to say that, contrary to what has generally been known of the *Ophyra leucostoma* Wied., it seemed to thrive better upon decaying animal than upon vegetable matter. Mégnin places this fly in his fifth "squad," which he has found on human cadavers buried about two years. It is interesting to note just here that Schöyen found another species of this same genus, *Ophyra anthrax* Meig., in one of the cemeteries of Kristiania, in graves which had been dug but two months before, just the period ot interment of the dogs in question. Schiner mentions *O. anthrax* as more rare than *O. leucostoma* still, in certain places very common; he found it in great numbers on the body of a dead horse in Kloster-neuberg.

On dogs buried for three months, this same Anthomyid, *O. leucostoma*, was found together with an undetermined Thysanuron and three Acarids of the Gamasid family: *Uropoda* sp., *Gamasus* sp. and *Hypoaspis* sp. The mites belong to Mégnin's sixth "squad," found on exposed human cadavers after two or three years. *Uropoda* I have found on twenty-one human cadavers, interred for periods varying from three years and six months to eleven years and seven months; *Hypoaspis*, on a human cadaver buried twenty-eight years; *Gamasus* on another, buried thirty-eight years and four months. While belonging to the same genus, it must be noted that the species of Gamasidæ found on dog cadavers are not identical with those found upon human cadavers.

On dogs buried for four months the principal find was the Phorid, *Conicera* sp., which was likewise bred in the laboratory through several generations. This fly is of special interest, because it was probably the first in America recorded by an accurate observer as having been found on a disinterred human cadaver; it will again be referred to later on.

On dogs buried for five months were found *Conicera* sp., adult flies and larvæ, together with *Uropoda* sp., identical with that found on dogs after three months' interment, but differing from that found on human cadavers; and, finally, an Elaterid beetle, *Monocrepidius bellus* Say, identical with that found on human cadavers after three years and two months' interment.

At this point the experimental work with dog cadavers ceased; first because there was such abundant material from the cemetery, and, secondly, because, according to Dr. Wyatt Johnston's experience, the results would be apt to be more confusing than helpful. Writing of his own observation in this line, Dr. Johnston said: "We were especially struck with the circumstance that Coleoptera which attack the bodies of animals early, *i. e.*, in a few days, will not attack human bodies unless these have been exposed some months. For this reason we avoided control experiments with dead animals and dead meat, as unreliable and misleading."

One other line of experimental investigation proved interesting and suggestive, though it was pursued in but two cases. At the suggestion of Mr. E. A. Schwarz, we buried in a cemetery, at a depth of three feet, two empty boxes which had been thoroughly cleaned and then closed with a well fitting cover securely nailed on. As it happened, we were enabled to place each of these boxes in a lot adjoining one in which an interment had recently been made, thus approximating, as nearly as might be, the conditions of an actual interment. After two months one of the boxes was taken up and found to contain a young Araneid, *Agalena nævia* Htz., several young Acarids of the Gamasid family, many Podurids (Thysanura), an undetermined Psocid, one small beetle, *Trichopteryx haldemani* Lec., and three Mycetophilid flies, *Sciara* sp. The second box, which was buried for a little over three months, was not quite so prolific, containing only one Araneid, *Theridium tepidariorum* Koch, and a few Podurids and *Lepidocyrtus* sp. (Thysanura). These small insects were no doubt feeding upon the delicate black fungus with which the boxes had become lined.

It is highly probable that further experiments in this line might be productive of interesting results. In the last case noted in the above list (No. 150) an empty (?) coffin, exhumed after seven years and three months, contained, among other things, the same beetle, *Eleusis pallida* Lec., which was found in such great numbers and under such varying conditions in fifty-six of the one hundred and fifty observations and after periods of interment ranging from one year and eleven months to eleven years and two months. The cemetery records show that this particular coffin was supposed to contain the product of a "Premature Birth," but it seems highly propable that the coffin was sent to the cemetery, minus the cadaver, and that the latter now adorns some one's embryologic collection.

In 1890 Mr. Webster published an interesting find of *Conicera* sp., on a two-year cadaver, in the stomach of which chemic analysis showed one and one-half grains of arsenic. Commenting on this case, Mr. Webster writes: "That the larvæ of these flies might subsist upon the flesh of bodies killed by arsenic is by no means surprising, as they are, doubtless, very tenacious of life. * * * That adults or larvæ could have made their way to the body through box and coffin, after burial, seems incredible; while that with the temperature but little above the freezing point flies should have been attracted to the corpse, while the latter was awaiting burial, and either deposited their eggs upon it before burial or have been conveyed within the coffin to the grave and there begun reproduction appears at first thought almost equally impossible."

Here, then, are raised the questions upon the answers to which rest the importance and practical value of all these observations. How, when and during what periods do these insects attack the human cadaver? Mégnin's answers seem to have been accepted by the French courts, and decisions rendered, sentences imposed in accordance therewith. His work has been abstracted in a large number of journals, and in several different languages; everywhere it is labelled "Important—if true." Dominique writes a conservative review, complimenting Mégnin upon his work, at the same time suggesting that the science of an entomologic chronology of cadaveric history must, of necessity, be a slow growth. Here and there, however, there have been more or less vigorous protests. It is significant that these protests and warnings have come largely from the entomologists, men whose sole specialty is the study of the characters and life habits of these insects. True, when we attempt to look up the life-history of any given insect, especially one not important from an economic standpoint, we are amazed at the paucity of data, even with regard to our most common species. Among those who have made the life habits of beetles a special study, is Major L. von Heyden, who denies Mégnin's assertion that the Nitidulid beetle, *Rhizophagus*, is attracted by the odor of the corpse, and declares that this beetle never feeds upon cadavers, but that it enters the grave as a parasite of the larva of another beetle (Scolytid) which infests the wood of which coffins are made. In spite of this high authority, I have found, in a number of cases the American cousins of this beetle feeding, beyond the peradventure of a doubt, upon the decomposing soft tissues and in the cancellated bone of the human cadaver.

Another item, about which we have yet much to learn, is with regard to the seasonal activity of a number of flies. Mégnin states, and he is confirmed by Webster's and by own experience, that the Phoridæ have been found on bodies interred in winter as well as in summer. But his conclusion, that the presence of Muscidæ indicates that the body in question was interred in summer and not in winter; and Johnston's and Villeneuve's conclusion, that the absence of Dipterous remains points to interment in winter and not in summer, have been too hastily drawn, if the study of but one hundred and fifty disinterments in Washington afford any criterion by which to judge. For, in ten of the one hundred and fifty cases, I have found the remains of a number of flies (Stratiomyid, Muscid, Sepsid and Borborid) on cadavers interred in December, January and February.

Two important facts must be noted just here: On the one hand, I have found, on looking up the recorded temperatures for several days preceding death and following burial, a degree of cold wholly incompatible with insect activity above ground; on the other hand, we not infrequently have in Washington, even in mid-winter, several successive days of sufficient warmth to start up the incubators of the omnipresent fly. That the presence of certain insects on a cadaver may indicate the exposure of that cadaver to a temperature favorable to the functional activity of these insects, is a conclusion wholly legitimate, and not without entomologic interest. Can it have any Medico-legal weight? To go before a Court of Law and to swear that because a Muscid was found upon a disinterred human cadaver, that cadaver *might* have been interred in June, but *could not* have been interred in January, would be to fly in the face of facts and to assert a proposition controverted by practical experience. Be it remembered that these remarks apply only to interred human cadavers, only to those interred in the vicinity of Washington, and only from the limited view of this field obtained from one hundred and fifty observations.

I am thoroughly convinced that we can not, as yet, make any broad, universally applicable generalizations on this subject. The field is far too broad, the important and modifying factors are far too numerous and conflicting, the conditions vary far too widely to be thus comprehended in any concise, unqualified formula. The only conclusion I can reach, as the result of my studies thus far, is that it is not safe to draw any conclusion at all. The vital point upon which the whole of Mégnin's theory of the fauna of exposed cadavers turns, is that the various insects appear in distinct "squads," at definite and specified periods of cadaveric decomposition, and that they succeed each other in regular order. That this proposition does not in any particular apply to the observations here noted is most evident from the following brief resumé of the work, taking only the more important mites, beetles and flies:

Acarina, 8 species found in 30 cases, interred from 3 years and 2 months to 71 years. Coleoptera, Pselaphidæ, 2 species found in 3 cases, interred from 16 years and 5 months to 28 years. Staphylinidæ, *Homalota*, found in 4 cases, interred from 1 year and 11 months to 10 years; *Staphylinus* found in 1 case, interred 15 years and 5 months; *Philonthus* found in one case, interred 5 years and 4 months; *Actobius* found in 22 cases, interred from 3 years and 2 months to 10 years; *Lathrobium* found in 3 cases, interred from 4 years and 4 months to 9 years and 9 months; *Pæderus* found in 1 case, interred 3 years and 2 months; *Eleusis* found in 56 cases, interred from 1 year and 11 months to 11 years and 2 months. Nitidulidæ, *Rhizophagus* found in 10 cases, interred from 1 year and 11 months to 28 years. Diptera, Phoridæ, puparia found in 43 cases, interred from 3 years and 2 months to 38 years; Muscidæ, 2 species found in 5 cases, interred from 3 days to 4 years and 1 month; Anthomyidæ, *Homalomyia* found in one case, interred 2 years and 11 months; Sepsidæ, *Piophila* found in 13 cases, interred from 3 years and 2 months to 10 years and 3 months.

Since the completion of this paper, the writer has received a reprint of Johnston & Villeneuve's paper, "On the Medico-Legal Application of Entomology," which was "read before the Canadian Medical Association, Montreal, August, 1896," and published in the *Montreal Medical Journal*, August, 1897. These authors assert that "one may now judge from the animal fauna met with in a dead body how long it has been exposed." But they add: "The chief danger to be feared from Mégnin's imitators is that they might tend to indulge in guesses having no very solid basis and to apply rules to countries and climates where they were inapplicable.'' They conclude that, ''it appears certain that observations and experiments upon exposed human bodies should be made in the particular locality before the present entomological data can be directly applied to legal medicine. * * * The time limits apparently require modification for the particular locality.''

It should be remembered that the experience of Johnston & Villeneuve has been almost entirely with exposed cadavers—as distinguished from the present observations on interred cadavers. They print an interesting table, which is hereto appended.

FAUNA OF DEAD BODIES EXPOSED TO THE AIR.*

(COMPILED FROM MÉGNIN.)

	Physical Conditions.	Minimum time.	Forms met with.
First Period........	Bodies fresh................	First three months.	(D) *Musca.** *Cyrtoneura.** *Calliphora.**
Second Period.....	Decomposition commenced		(D) *Lucilia.** *Sarcophaga.**
Third Period......	Fatty acids....................	3 months to 6 months.	(C) *Dermestes.** (L) *Aglossa.*
Fourth Period	Caseous products...........		(D) *Piophila.** *Anthomyia.* (C) *Necrobia* (*Corynètes*).
Fifth Period........	Ammoniacal fermentation, black liquefaction	4 months to 8 months.	(D) *Thyreophora.* *Ophyra.** *Lonchea*, *Phora.* (C) *Necrophorus.* *Silpha.** *Hister.** *Saprinus.**
Sixth Period	Desiccation	6 months to 12 months.	(A) *Uropoda.* *Trachynotus.* *Tyroglyphus.** *Glyciphagus.* *Serrator.*
Seventh Period...	‘‘ extreme......	1 year to 3 years.	(L) *Aglossa.* *Tineola.* (C) *Attagenus.* *Anthrenus.*
Eighth Period.....	Debris	Over 3 years.	(C) *Tenebrio.* *Ptinus.*

FAUNA OF BURIED BODIES.

Before Burial	(**D**) *Calliphora*,* *Cyrtoneura.*
After Burial	(**D**) *Ophyra*,* *Phora.*
(The genera marked * in the table are those met with by ourselves.)	(**C**) *Philonthus*,* *Rhizophagus.*
	(**T**) *Achorutes*, *Templetonia.*

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EXPLANATION OF TABLES.

TABLE I. Showing entire "find" on human cadavers buried for varying periods. In the first column are given the serial numbers, with numbers referring to notes on individual observations. Next is indicated the duration of interment, expressed in years and months; then the month in which interment was made and that in which the body was disinterred. Then follow the depth of the grave and character of soil—"s" = sandy, "c" = clay, and "sc" = sand and clay mixed. The degree of moisture, noted in the grave at the time of disinterment, is indicated as follows: 1 = dry, 2 = moist, 3 = wet, 4 = coffin submerged. The figures in the body of the table indicate the number of the specimen or specimens, in the Stiles-Motter collection of grave-fauna, to be deposited in the U. S. National Museum. Some of these specimens, more particularly of the lower forms, have not as yet been fully determined.

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* (**D**) Diptera, (**C**) Coleoptera, (**L**) Lepidoptera, (**A**) Acari, (**T**) Thysanura.

TABLE I.—Showing the entire "find" on Human Cadavers buried for

																	INSEC												
																			COLEOPTERA.										
		Period of Interment.		Month of Interment.	Month of Disinterment.	Depth of Grave.	Character of Soil.	Degree of Moisture.	Mollusks (Gastropoda).	Earthworms.	Crustacea.	Pseudoscorpiones.	Araneida.	Acarina.	Myriopoda.	Thysanura.	Pseudoneuroptera.	Undetermined.	Carabidæ.	Pselaphidæ.	Staphylinidæ.	Homalota.	Staphylinus.	Philonthus.	Actobius.	Lathrobium.	Pæderus.	Eleusis.	Nitidulidæ.
		Y.	M.																										
1	H. 304	1	11	V	IV	6	s	2				P				12						P						P	P
2	H. 356	2	10	VII	V	6	sc	4								182													
3	H. 301	3	1	III	IV	5	sc	3			3			Sl		4													
4	H. 352	3	2	II	IV	6	sc	4		166				172											170		167	170	
5	H. 315	3	3	II	V	3*	s	1																					
6	H. 390	3	5	I	VI	5	sc	4																					
7	H. 398	3	6	XII	VII	5	sc	2						279		0												281	
8	H. 401	3	6	XII	VII	5	sc	2						290		288												289	
9	H. 404	3	6	XII	VII	5	sc	2					299	298		0									296			297	
10	H. 405	3	6	XI	VII	5	sc	2						301		0												302	
11	H. 397	4	1	VI	VII	5	sc	2						273											277			278	
12	H. 399	4	1	VI	VII	5	sc	2						282														283	
13	H. 400	4	1	V	VII	5	sc	2					285	287															
14	H. 406	4	1	V	VII	3	sc	1						304		308													
15	H. 408	4	1	V	VII	5	sc	2						316		0	318								?			319	
16	H. 407	4	2	V	VII	5	sc	2						313											311	310			
17	H. 414	4	2	V	VII	5	sc	2						341											338			337	
18	H. 403	4	3	III	VII	5	sc	2						292		0									295			293	
19	H. 409	4	4	III	VII	5	sc	2						320														321	
20	H. 394	4	5	I	VI	4	sc	2								268									266	267			
21	H. 440	4	10	IX	VII	4	sc	2																	396			395	
22	H. 433	4	11	VIII	VII	3	sc	2																					
23	H. 300	5	0	IV	IV	6	c	4								2													
24	H. 333	5	0	V	V	5	s	4								101 100												P	
25	H. 305	5	0	IV	V	6	s	4								13													
26	H. 392	5	3	IV	VI	5	sc	3								259												260	
27	H. 393	5	3	III	VI	5	sc	2																	262			261	
28	H. 396	5	3	III	VI	5	sc	4						273														272	
29	H. 391	5	4	III	VI	5	sc	3						255		0						257			256			256 258	
30	H. 385	5	4	II	VI	5	sc	4								243													
31	H. 395	5	4	II	VI	5	sc	3								270												269	
32	H. 410	5	4	II	VII	5	sc	2								324			323									?	
33	H. 417	5	4	II	VII	3	sc	2							351									?					349
34	H. 386	5	5	I	VI	5	sc	3								245									244			246	
35	H. 387	5	5	I	VI	5	sc	3						Sl		248												247	
36	H. 388	5	5	I	VI	5	sc	3						251		0												252	
37	H. 412	5	5	I	VII	5	sc	2						336		332												334	333
38	H. 372	6	0	VI	VI	5	sc	2				207			206														
39	H. 416	6	2	IV	VII	5	sc	2						346		347						348						344	343
40	H. 420	6	3	IV	VII	5	sc	4								357													
41	H. 357	6	5	XII	V	6	sc	4								184													
42	H. 389	6	5	I	VI	5	sc	4								0		253 F											
43	H. 421	6	5	II	VII	5	sc	3								358									360			359	
44	H. 424	6	5	II	VII	5	sc	4								362													
45	H. 306	6	9	VIII	V	6	sc	4								14 15													
46	H. 353	6	11	V	IV	4	sc	4							177													176	
47	H. 443	7	0	VII	VII	4	sc	2	403		?		402			0													
48	H. 437	7			VII	5	sc	2								390					389 F				386			385	
49	H. 351	7	4	XII	IV	5	sc	4								164												165	
50	H. 448	7	4	III	VII	5	sc	2					417	420		422												415	
51	H. 450	7	4	III	VII	5	sc	2								429												427	
52	H. 428	7	7	XII	VII	5	sc	2								363												364	
53	H. 431	7	7	XII	VII	5	sc	2						374		0												369	
54	H. 429	7	8	XI	VII	5	sc	2								0												365	
55	H. 432	7	8	XI	VII	5	sc	3								0												375	
56	H. 438	7	8	X	VII	5	sc	2																	391			392	
57	H. 430	7	9	X	VII	3	sc	2								366												368	
58	H. 435	7	9	X	VII	5	sc	2								380									381			382	
59	H. 436	7	10	IX	VII	5	sc	2								383												384	

ng the entire “find” on Human Cadavers buried for varying periods.

					INSECTA.																											
							COLEOPTERA.																	DIPTERA.						Hymenoptera		
Crustacea.	Pseudoscorpiones.	Araneida.	Acarina.	Myriopoda.	Thysanura.	Pseudoneuroptera.	Undetermined.	Carabidæ.	Pselaphidæ.	Staphylinidæ.	Homalota.	Staphylinus.	Philonthus.	Actobius.	Lathrobium.	Pæderus.	Eleusis.	Nitidulidæ.	Trogositidæ.	Elateridæ.	Scarabæidæ.	Curculionidæ.	Larvæ (Genus.)?	Stratiomyidæ.	Phoridæ.	Muscidæ.	Anthomyidæ.	Sepsidæ.	Borboridæ.	Formicidæ.	Poneridæ.	Myrmicidæ.
	P				12						P						P	P														
					182																					180	181					
3			Sl		4																				5							
			172											170		167	170			168				L 169	174			171	173			
																									19							
																										254						
			279		0												281								280							
			290		288												289								291							
		299	298		0									296			297											300				
			301		0												302						303									
			273											277			278									275		276				
			282														283															
		285	287																						286							284
			304		308																				306	305		309				
			316		0	318								?			319						317		315							
			313											311	310										314							
			341											338			337						339									
			292		0									295			293						294									
			320														321						322									
					268									266	267								265					264				
														396			395						397									
																							377 378									
					2																	1										
					101 100												P															
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			273														272															
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					324			323									?															
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			336		332												334	333					335									
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					429												427						428									
					363												364															
			374		0												369						370 371 372		373							
					0												365															
					0												375						376									
														391			392															
					366												368						367									
					380									381			382						379									
					383												384															

43	H. 421	6	5	II	VII	5	sc	3								358									360			359	
44	H. 424	6	5	II	VII	5	sc	4								362													
45	H. 306	6	9	VIII	V	6	sc	4								14 15													
46	H. 353	6	11	V	IV	4	sc	4							177													176	
47	H. 443	7	0	VII	VII	4	sc	2	403		?		402			0													
48	H. 437	7	.....	....	VII	5	sc	2								390					389 F				386			385	
49	H. 351	7	4	XII	IV	5	sc	4								164												165	
50	H. 448	7	4	III	VII	5	sc	2					417	420		422												415	
51	H. 450	7	4	III	VII	5	sc	2								429												427	
52	H. 428	7	7	XII	VII	5	sc	2								363												364	
53	H. 431	7	7	XII	VII	5	sc	2						374		0												369	
54	H. 429	7	8	XI	VII	5	sc	2								0												365	
55	H. 432	7	8	XI	VII	5	sc	3								0												375	
56	H. 438	7	8	X	VII	5	sc	2																	391			392	
57	H. 430	7	9	X	VII	3	sc	2								366												368	
58	H. 435	7	9	X	VII	5	sc	2								380									381			382	
59	H. 436	7	10	IX	VII	5	sc	2								383												384	
60	H. 439	7	10	IX	VII	5	sc	2								394												393	
61	H. 444	7	10	IX	VII	5	sc	2								407												406	
62	H. 419	8	2	V	VII	5	sc	2								356									354			353	352
63	H. 415	8	2	IV	VII	5	sc	2								0												342	
64	H. 411	8	2	V	VII	5	sc	2								331									329			328	330
65	H. 313	8	3	II	V	5	sc	4								17 18													
66	H. 358	9	4	I	V	6	sc	4								186													
67	H. 383	9	9	IX	VI	5	sc	2								0										241		242	
68	H. 381	10	.....	VII	VI	5	sc	3								229 231		230 F										227	
69	H. 382	10	.....	VII	VI	5	sc	2			238					237						232						232 233	
70	H. 366	10	2	IV	VI	4	sc	4								0												203	
71	H. 364	10	3	III	VI	5	sc	4								201													
72	H. 361	10	3	III	VI	6	sc	4								193												192	
73	H. 363	10	4	II	VI	5	sc	4	199	197	200					0												198	
74	H. 302	10	7	IX	IV	9*	s	2			6					7 10													
75	H. 362	10	8	IX	VI	5	sc	4								195													196
76	H. 367	10	8	X	VI	6	sc	4								204													
77	H. 365	11	2	IV	VI	5	sc	4								0												202	
78	H. 329	12	11	VII	V	6*	s	1			86		84		83 87		85												88
79	H. 331	15	5	XII	V	7*	s	1					98 0		95 97								P						
80	H. 360	15	10	IX	VI	4	sc	4								188			190										
81	H. 373	16	5	I	VI	9*	s	2	217	210	212	211	214		213	219				209									208
82	H. 317	18	11	VI	V	3*	s	1			29		28		27														
83	H. 316	20	.....	VI	V	3*	s	1		21	25 26				24														
84	H. 332	20	.....	V	V	9*	s	1																					
85	H. 320	20	3	II	V	5*	s	1							39														
86	H. 322	20	7	VIII	V	4*	s	1	47							46													
87	H. 330	20	9	VIII	V	6*	s	1							91 93				P										
88	H. 321	21	+	....	V	3*	s	1	43	41					42 44														
89	H. 319	21	+	....	V	6*	s	1	36				35		32 33 34														
90	H. 318	21	+	....	V	3*	s	1							30														
91	H. 323	21	+	....	V	4*	s	1	50						49					52									
92	H. 324	21	+	....	V	6*	s	1							53														
93	H. 325	21	+	....	V	4*	s	1	60 65				59		58 61 63														
94	H. 326	21	+	....	V	6*	s	1							67														
95	H. 327	21	+	....	V	6*	s	1	69 70 72				74		73 76 78	75													
96	H. 328	21	+	....	V	6*	s	1					80		79 81														
97	H. 349	27	...	XI	XI	8*	s	1							131														
98	H. 337	29	1	V	VI	6*	s	1					106																
99	H. 348	38	4	VI	XI	6*	s	1					128	129	127														
100	H. 307	71	.....	V	V	6	s	1	16					Sl															

“Degree of Moisture”: 1 = dry; 2 = moist; 3 = wet; 4 = coffin submerged.

“Character of Soil”: “s” = and; “c” = Clay.

* Coffin was inclosed in four-inchbrick wall laid in cement and covered with stone or slate slabs similarly sealed.

“P” =

“Sl” =

“O” =

					358									360			359						361									
					362																											
					14 15																											
				177													176											175				
?		402			0																				405							
					390					389 F				386			385						387									
					164												165															
		417	420		422												415						416					418	419			421
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		80		79 81																					82							
				131																					130							
		106																												P		
		128	129 Sl	127																					126							

wet; 4 = coffin submerged.

cement and covered with stone or slate slabs similarly sealed.

“P” = pinned specimen, “F” = fragments.
“Sl” = specimen mounted on slide.
“O” = specimens not retained in collection.

TABLE II.—Showing the mites, beetles and flies found on INTERRED canine and human cadavers. D
months. Human cadavers buried for periods varying from 1 t

	DOG.				D	M	INTERRED HUMAN																		
	2	3	4	5	3	2	1		2		3		4		5		6		7		8		9		10
ACARINA.																			+						
Gamasidæ, Gamasus,		+			Negro drowned Aug. 29, body recovered Aug. 30, examined Sept. 2.	Human cadaver disinterred after two months.																			
" Holostaspis,																									
" Hypoaspis,		+																							
" Iphis,																									
" Uropoda,		+		+																					
" U. depressa,											+	+	+		+		+		+	+					
Tyroglyphidæ, Tyroglyphus,											+														
" Hypopus,																									
Orbatidæ, Hoplophora,																									
COLEOPTERA.																									
Pselaphidæ, Batrisus.																									
Staphylinidæ, Homalota,								+							+		+								+
" Staphylinus,																									
" Philonthus,															?										
" Actobius,											+		+	+	+		+		+	+	+				+
" Lathrobium,													+											+	
" Pæderus,											+														
" Eleusis,								+			+		+	+	+		+	+	+	+	+			+	+
Nitidulidæ, Rhizophagus,								+							+		+				+				
Elateridæ, Monocrepidius,				+							+														
DIPTERA.																									
Stratiomyidæ,											+														
Phoridæ, puparia,											+		+		+		+		+	+				+	+
" P. clavata,	+																								
" Conicera,			+	+					*+	Webster, F. M., Insect Life, V. II, p. 356-370, 1890.															
Muscidæ, Compsomyia,					+						+														
" Lucilia,	+				+					+			+												
Anthomyidæ, Homalomyia,										+															
" O. leucostoma,	+	+																							
" *Ophyra anthrax,						*+	Schöyen, W. M., Entomologisk Tidskrift (Stockholm), pp. 121-124, 1895.																		
Sepsidæ, Piophila,											+		+				+	+	+				+		+
Borboridæ,											+								+						

* Reported by other observers.

ound on INTERRED canine and human cadavers. Dog cadavers buried for periods varying from 2 to 5
Human cadavers buried for periods varying from 1 to 71 years.

INTERRED HUMAN CADAVERS.

2	3		4		5		6		7		8		9		10		11		12		13		14		15–20		20–30		30–40		71	
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Webster, F. M., Insect Life, V. II, p. 356–370, 1890.															.....	.....	+	.....	.....	.....	.....	.....	.....	+	.....	.....	+	+	.....	+	.....	.....
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Schöyen, W. M., Entomologisk Tidskrift (Stockholm), pp. 121–124, 1895.																			.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
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TABLE 2, groups the mites, beetles and flies, which have been held to be especially significant as time-indicators, and shows that the same species have been found after widely varying periods of interment. This is in direct contrast with the "principle" hitherto deduced, from observations on exposed cadavers, "that the products formed at different epochs in the progress of decomposition attract certain forms and repel others." A principle which Mégnin reiterates in a recent "Note sur une collection d'Insectes des cadavres interessants a connaitre au point de vue Medico-legal, offerte au Museum."

NOTES ON CERTAIN SOUTH AMERICAN COCHLIDIIDÆ AND ALLIED FAMILIES.

By HARRISON G. DYAR.

At my request Mr. W. Schaus kindly brought me a number of moths from his collection for examination. Many of them are his types of species recently described and the rest have been carefully determined by him. The following notes are based on this material. It includes the groups closely allied to the Cochlidiidæ as well as that family itself, and one species of Ptilodontidæ, which was improperly described as a Cochlidian.

Family DALCERIDÆ.

Synopsis of Genera.

Fore wings without accessory cell; antennæ with prominent scale tuft at tip.
  Vein 6 arising above discal vein; vein 11 from cell.................. **Dalcera**
  Vein 6 arising below discal vein; vein 11 stalked with 9 and 10.... **Dalcerina**
Fore wings with accessory cell; antennæ without scale tuft.
  Veins 9 and 10 long stalked, but distinct.......................... **Acraga**
  Veins 9 and 10 coincident, 9 absent or invisible.
    Hind wings ovate, rounded.............................. **Dalcerides**
    Hind wings trigonate, inner margins long................. **Epipinconia**

Genus **Dalcera** *H.-S.*

1855—*Dalcera* HERRICH-SCHÄFFER, Ausser. Schmett. I. 7.

Type, *abrasa* H.-S.: also *fumata* Schaus, both before me. Möschler has given the generic characters. Others species listed are *obscura* Schs., *alba* Druce, *laxata* Druce, *ampla* Druce and *leberna* Druce, but I have not examined them.